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annual meeting, the valuable character of our programme, are all an earnest of growth and active labor. Let us all lend the promising youngster our warmest wishes for a vigorous and useful career, and join in the cheer, long life, and a busy one, to the Western Society of Naturalists.

SKETCHES OF THE CASCADE MOUNTAINS OF OREGON.

BY E. D. COPE.

THE Cascade Mountains of Oregon are destined to be the favorite resort of tourists who love all that is most beautiful, impressive and wild in mountain scenery. Lying over one of the greatest of the fractures of the earth's crust, they represent the remains of successive outflows of molten material at its source. The basis of the range is eruptive, and displays the irregularities of surface due to such origin within comparatively recent geological ages, and to the rapid erosion which naturally occurs in a humid climate. Thus gorges of great depth traverse its masses, and precipices of tremendous height bound many of its elevations. Beautiful lakes nestle in its depressions, and waterfalls leap from level to level on their way to the tributaries of the Columbia. All is clothed in sombre forest of conifers, of larger proportions or more elegant foliage than can be found in any other region. High above all these mountains tower at intervals along the range, the great snow-peaks which give the region its especial beauty. These are extinct volcanoes which raised themselves round vents which long remained open, and which poured out lava, scoriæ, pumice and ashes, after the great fissure was closed.

The great lava outflow from the Cascade Mountain fissure is one of the most extensive the world has ever seen, and was one of the most destructive in its consequences. There were several distinct periods of outflow, two being especially distinguishable in the stratigraphy of central Oregon. Between the outflows from this and from lesser sources to the eastward, a country of eight hundred miles in east and west extent, and one hundred and fifty miles from north to south, was covered with lava and other ejectamenta, rendering it uninhabitable by animal life. The volcanic materials are found for several hundred miles to the north, at some points continuously with the great tract I have mentioned. The exact connection with the latter remains to be ascertained; but both were deposited at about the same geological period; viz.: from some time in the Eocene to late in the Miocene ages. The area covered is not less than 1,600,000 square miles in extent, embracing all of central and southern Oregon and southern Idaho, and large tracts in Tacoma Territory. As an offset to this terrible and unexampled desolation of one of the fairest parts of the earth's surface, we have the great snow-peaks standing as silent and imperishable monuments of one of the most tremendous of the wars of the elements that the later earth has experienced.

The grand tour of Oregon is commenced by crossing the gap in the Cascade range at Ashland, just north of the California border, and visiting the Klamath Lake on the eastern side of the watershed. Turning northward, the tourist should visit the Crater Lake, twenty-five miles from Fort Klamath, and return. Then go northward again on the edge of the plateau that overlooks the valley of the Des Chutes River toward the west, from which the highest of the ranges of the Cascades rise, and may be seen in all their magnificence. Continuing on this road, now a stage route, the Dalles of the Columbia river are reached. Thence take the steamer down the river for Portland. The scenery of the long pass of the Columbia through the Cascade Mountains has been often praised, but never too highly. From Portland excellent means of transportation south, up the Willamet valley, will return the traveller to Ashland again, and the grand tour is completed. A trip from Portland to the resorts on the coast-range must not be omitted, for from these can be seen, it is said, twenty of the snow-capped summits of Oregon and Tacoma (Washington), on the one side, and the boundless waters of the Pacific Ocean on the other.

The traveller must make this journey in a private conveyance, if he can do so, excepting as to the Columbia River. He should commence at Sisson's, at Mount Shasta, in northern California. Then he will see the mountains in all their changing moods at his leisure. He will become personally acquainted with each of the great landmarks as he passes them one by one. First, Shasta of colossal dimensions. Then the perfectly regular Mount Pitt, which overlooks Lake Klamath. Then the Batchelor with blunt apex; next Mount Cope, with its dome and its lower twin summit; and twenty miles to the north, the two peaks of Mount Condon joined at their bases, acute and inaccessible. At a longer interval follows Mount Jefferson, which rears its immense bell-shaped mass from a widely spreading base, to a height of 13,000 feet. Finally, near the Columbia, the perfect cone of Mount Hood lifts its head 14,000 feet and more to the skies. The form of all these peaks is essentially Andean. They are, like Popocatapetl, Cotopaxi, and Pichincha, of a general conical form, and thus quite different from the mountains of the Rocky range, or the Alps, which are mostly culminations of larger masses, or rise from plateaus, so that the visual effect of their elevation above the sea is largely lost. The case is quite different with ranges whose base is, like that of the Cascades, but little elevated above the sea. In the latter nearly the entire elevation is visible. The Cascades also, gathering the moisture from the ocean in a northern latitude, receive and display a greater deposit of snow than ranges of greater elevation in drier or more southern regions. (Plates XX and XXII.)[1]

Although there are many lovely lakes in the Cascade Mountains, none is so remarkable as Crater Lake. This is a body of water which occupies an extinct crater of large size. It is of an oval form and about eight miles by six in diameter. The walls which surround the water rise to a height varying from 900 to 3,000 feet, and they are so precipitous that their descent is practicable at very few points. At the time of my visit (in 1879) but one mode of access to the water was known to my guides. This I descended to the water's edge. It is a very steep washed slope covered with loose stones and scoriæ, among which the descent is much more easy than the ascent. To the south of the centre of the lake is an island which consists principally of a volcanic cone, with a distinct crater in its summit. This represents the latest centre of activity of the volcano. Its sides were covered with tall firs at the time of my visit. The depth of the water is very great. Captain C. E. Dutton, of the present U. S. Geological Survey, informed me that he obtained 1,900 feet as the greatest depth, and 1,500 as the average, in 1886. (Plate XXI.)

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[1] The plates referred to will appear in the next number of the Naturalist.

At the time of my visit Colonel Whipple was in command at Fort Klamath. He carried out a projected visit to Crater Lake at this time and kindly gave me the opportunity to accompany him. As we left the Post we were greeted by the clamor of the beautiful white-headed woodpeckers (*Picus albolarvatus* Cassin) which nested in the tall pines near the officers' quarters. We soon passed seven-mile creek, which abounds in the red-spotted trout of the Pacific coast, or the "dolly-varden" (*Salvelinus malma*), and commenced the ascent. We followed the course of a mountain torrent which often disclosed in its precipitous banks the friable volcanic material of which the mountain is composed. Sand and ashes, with here and there strata of fragments of scoria and lava were principally visible. The soil was evidently good, for it supported a luxuriant forest of trees and undergrowth. Prominent among the former are two beautiful firs, whose foliage is elegant but broadly contrasted in character and appearance. These are the *Abiës nobilis*, and the *A. pattoniana.* The foliage of the former is rigid, and the disposition of the terminal branches almost rectangular. The green is of a rather dark shade. The second species is, on the other hand, feathery in foliage and gracefully drooping in branches, and the green is paler. Above both these species towers the monarch of the north-west, the Douglass fir (*Abiës douglassii*), the largest species of its genus, forming the bulk of the forest. But it yields in height to the occasional sugar pine, *Pinus lambertiana*, with its graceful candelabra-like branches and long cones, the tallest of pines and a fit mate for the Douglass fir.

On our ascent we passed a herd of blacktail deer, which were browsing in security on an open slope of the creek banks. By evening we were encamped on a babbling run under the shade of towering firs. The whisky-jacks, *Perisoreus canadensis*, flitted from branch to branch, and descended to inspect our proceedings with their usual familiarity. Half jay and half titmouse, this bird makes a home of every camp, and tends no little to relieve the sense of savage wildness by its pretty and confiding ways.

By early morning we were at the summit. This was simply an open grassy expanse on the eastern edge of the awful chasm, surrounded by an irregular border of the forest. The day was clear, and everything could be seen in perfection. Far down on the water I descried a moving white speck, probably a trumpeter swan, as no smaller bird would have been visible at the distance. Across the gulf rose the two points of the mountain called by the hunters the "Rabbit's Ears;" and further to the north-west the aiguille, known as "Cowhorn Peak." The water of the lake glistened in the sun, oblivious to the awful scenes that had once rendered this place the pandemonium of the continent. I descended to the water's edge, and examined carefully for traces of animal life. I found a very young larva of a salamander. More fully grown specimens have been since obtained by Lieutenant Carpenter, U. S. Army, and sent to the National Museum, which are probably the young of *Amblystoma macrodactylum*, the only salamander that has been found adult in that region. Then I found larvæ of Phryganeidæ and Ephemeridæ, and some minute crustacea, as Gammari and water-fleas. Among the rocks on and beside the slope, the "little chief" hare, *Lagomys princeps*, crept in and out, uttering the while its peculiar plaintive cry. It is a rather tame animal, and apparently possessed of much curiosity, but it has always a fissure in the rock at hand into which it retreats if one approaches too near.

The walls of the crater on the eastern side are made up of successive layers of lava, scoria, sand, ashes, pumice, etc., all representing successive eruptions and parts of eruptions. The mass is in places friable, and is penetrated by the waters of the lake at different points, thus giving origin to springs and streams.

At Fort Klamath the soil rests on a deep stratum of pumice. Some of the exposures show this to be broken up and water worn, but at other places it forms a continuous spongy mass. In a stratum of this kind, just below the soil, were cut the four graves of the Modoc Indians, who were hung for the assassination of General Canby, the commissioner sent by the United States to treat with the tribe. These graves were cut out with right angles and borders by the simple use of a sharp spade. At the time of my visit all of them had been rifled, and the bodies taken away. I afterwards obtained the skeleton of one of them. It is characterized by a platycnemic tibia, and tritubercular second and third superior molars.

Soon after this visit I left Fort Klamath for a geological explo-

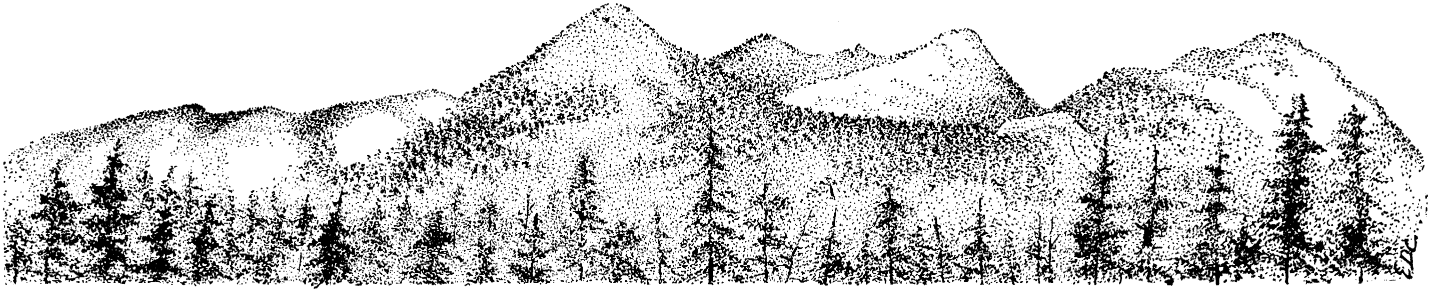

PLATE XIX.—View from Lake Klamath, looking north towards Crater Lake.

ration of the Oregon desert. Of this I may have something to say at another time. I found unexpected assistance in this exploration through Mr. Charles Whittaker, son of the Governor of the State, who kindly placed his time and conveyance at my disposal, and accompanied me to Fossil Lake, and the sandy region beyond. We returned via Silver Lake, and took the main road for the Dalles. This road runs north along the western edge of the sage-brush and the eastern border of the valley of the Des Chutes river. There is nothing to obstruct the view of the Cascade range from this road, and as the greatest elevation of the range is at its eastern border, the view of it from this road is the finest that can be obtained. At a point twenty to twenty-five miles south of Prineville, nearly half the length of the Oregonian portion of the range is included in the panorama, at a least distance of seventy-five miles. From the line of forest-covered mountains rise five magnificent snow-peaks to heights varying from 10,000 to nearly 15,000 feet above sea level. To the north is Hood; then succeeds Jefferson; then Condon, Cope, and the Batchelor. As these mountains do not rise from a plateau as do those of Colorado, the effect they produce is more impressive than that of mountains of greater elevation in the latter region. The wedge of Hood and the cone of Jefferson only find their counterparts in the celebrated volcanoes of the Cordilleras, whose praises have been often celebrated; but nowhere can five Cotopaxis be seen at one view, but in the Cascades of Oregon. They are ideal mountains, grandly simple, whose outlines, rising from base to summit, are only interrupted by vast precipices. They pierce the blue sky with a vertical mile and more of purest white "as no fuller can white," save where the crags are too steep for the snow to cling. When I first saw Mount Hood, nothing but its cone was visible, an island of light, floating in a sea of clouds. When I saw it last, clouds had again separated its summit from the earth, and the rays of the sun gave it an Alpenglühn which resembled the red glow of a furnace, rather than the cold sheen of the ice-peak. Mount Condon is a double mountain, consisting of two peaks with sharp summits, connected by a high saddleback. Its outlines are as steep as those of the others, and it presents an immense surface of snow. Mount Cope is twenty miles south. Its summit is an obtuse cone surrounded by impassible precipices. It is next to Mount

Jefferson in elevation. These mountains are two of the four sometimes called the "Three Sisters." They were given distinct names by the late Dr. Hayden, director of the U. S. Geological Survey of the Territories, but his ill health and death prevented his issuing any publication on the subject. Mount Condon was dedicated to Professor Thomas Condon, of the University of Oregon, a distinguished teacher of geology, and the discoverer of the Miocene beds of the John Day river, of Oregon, which have produced so many remarkable vertebrate fossil remains. The Batchelor has an obtuse apex and resembles somewhat Mount Etna in its outline. A general view of these mountains is given in the accompanying sketches, which I took from two of our camps. One of the last views I gained of the snow-peaks was in the morning as the sun rose. The valley of the Des Chutes was, as before described, filled with white clouds, and these rose to such an elevation as to conceal all but the summits of the volcanic cones. As the sun's rays rested on them they all glowed with such intensity that they could be well compared to masses of red-hot iron suspended in the heavens; and by a stretch of imagination be conceived as once more in their hoary age, ablaze with their internal fires, attempting to revive the terrible glories of the past.

Our road took us away from these sublime scenes of the upper world, to equally extraordinary, if not as gigantic exhibitions of the ancient activity of the volcanoes in the bowels of the earth. We descended into the canyon of the Des Chutes and followed its course for many miles. The descent could not have been less than 2,000 feet, and was accomplished by zigzags and stages innumerable. Prof. Newberry has described this canyon in his report in the series of the U. S. Pacific R. R. Survey volumes. Its walls display a remarkable section of the materials which the eruptive forces cast far and wide, or forced to flow over this afflicted country. High upon the walls of the canyon is a horizontal layer of columnar basalt, the columns vertical. Below this, separated by many feet of a friable deposit, is a stratum of well defined, apparently sedimentary, rock. A deep bed of ash is followed below by another bed of columnar basalt, and this again after an intermediate soft stratum, by a third bed. In the two lower beds the columns are variously disposed. They are frequently curved, forming concentric arcs, disposed in various directions according to locality. Sometimes the columns are horizontal, resembling piled cord-wood, and all are generally regular and more or less artificial looking.

From this extraordinary gorge we finally issued on a rolling country well covered with bunch-grass, which continued to our destination, the Dalles, on the Columbia river.

EDITORS' TABLE.

EDITORS: E. D. COPE AND J. S. KINGSLEY.

In the annual address of the President of the Biological Society of Washington, Mr. G. Brown Goode, Assistant Secretary of the Smithsonian Institution, uses the following language:[1] "I think the general tendency of a careful study of the distribution of scientific men and institutions, is to show that the people of the United States, except in so far as they sanction by their approval the work of scientific departments of the Government, and the institutions established by private munificence, have little reason to be proud of the national attitude towards science." This indictment is brought after a careful survey of the ground by a naturalist of undoubted competency, and of exceptional opportunities for acquiring information. We are compelled to agree with Secretary Goode, and can, we think, point out some of the conditions of this state of affairs.

Our complaint is that the average American citizen does not know what original scientific research is, and that if he acquires wealth, and wishes to do something for the benefit of his fellow-men, as he does more frequently than the citizen of any other country, he does not do anything for the *production* of knowledge. He devotes money to schools and to libraries, but towards the creation of the books to be used in them, and the truths to be taught in them, he does nothing. Forgetting the lessons of his business training, he apparently imagines that knowledge is derived from some mysterious internal process of the mind, and that the producer

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[1] 1887, pp. 92–3.